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PHOBOS AND DEIMOS: A BASE FOR SAMPLING THE MARTIAN PAST; S.F.  
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The Martian satellites are of unique interest: as platforms for detailed Mars exploration and for later Mars habitation, as low-cost accessible sources of materials for propellants and construction, and as objects of intrinsic scientific value. Their origin is a mystery--whether captured or formed in place, perhaps remnants of an original larger body, or perhaps unmodified examples of primitive planetesimals.

A manned Ph.D. mission can accomplish the scientific and resource objectives sooner and at lower cost than either a long series of unmanned missions directed from the Earth or a series of manned landings on the Martian surface. The Ph.D. mission can direct a series of unmanned rover vehicles to all parts of the surface and recover samples, including cores, for analysis in a Deimos-based laboratory. This sequential experimentation permits exploration of the most promising, and perhaps most difficult, terrain for a study of the geologic, climatic, and possibly biologic history of the planet Mars. Data on past climates could shed light on climate processes on the Earth. It is widely believed that Mars was initially wet and warm, providing an environment suitable for the development of life forms. The discovery of fossil life or cryptolife would represent a major scientific achievement.

The Ph.D. mission promises to be no more difficult or costly than proposed manned missions to the Moon or to earth-crossing asteroids. To fit into an early timeframe, it would use chemical propulsion plus aerobraking, but would build on the experience of the U.S. and Soviet space stations to deal with the habitat and zero-g problems of a 2-year round trip.